GCSE

Science A / Chemistry

CH1FP

Mark scheme

4405 / 4402

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Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded
- the Assessment Objectives and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening and underlining

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of error / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, without any working shown.

However, if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column or by each stage of a longer calculation.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Ignore / Insufficient / Do <u>not</u> allow

Ignore or insufficient are used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

Quality of Written Communication and levels marking

In Question 6(b) students are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Students will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

Level 1: basic

- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

Level 2: clear

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

Level 3: detailed

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)	gold		1	1 / 1.3.1c
1(b)	atom (s)		1	1 / 1.1.1a
1(c)(i)	protons neutrons	any order allow proton allow neutron	1 1	1 / 1.1.1c/h
1(c)(ii)	3 / three		1	2 / 1.1.1e/g / 1.1.2a
1(d)(i)	Al	ignore any numbers / charges	1	2 / 1.1.1b
1(d)(ii)	any **two** from: • limited resource • expensive in terms of energy / mining • effects on the environment, such as, landfill, atmospheric pollution, quarrying	allow uses a lot of energy to extract	2	1 / 1.3.1e/i/j
1(e)	resistant to corrosion does not react (with water or food)	allow **one** mark for low density with a suitable reason given	1 1	2+3 / 1.3.3c
Total			**10**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	central block		1	1 / 1.3.3a
2(a)(ii)	conducts electricity		1	1 / 1.3.3a
2(b)	any **two** from: • visual pollution • noise pollution • dust pollution • habitat destruction		2	2 / 1.3.1b
2(c)(i)	to concentrate the ore/copper carbonate **or** to remove / separate the rock		1	2 / 1.3.1b
2(c)(ii)	12 (tonnes)	If answer is incorrect allow one mark for (127 + 132) – 247 or 259 - 247	2	2 / 1.1.3c
2(c)(iii)	any **one** from: • so no reactant is wasted/left unreacted • so they know how much product they will make • need to record/compensate for the carbon dioxide produced	allow so they can work out their carbon footprint	1	3 / 1.1.3c
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)(i)	mixture (of different substances)		1	1 / 1.4.1a
3(a)(ii)	boiling (points)		1	1 / 1.4.2c
3(a)(iii)	distillation		1	1 / 1.4.1b
3(b)(i)	combustion		1	1 / 1.4.3b
3(b)(ii)	(reactant) oxygen (products) carbon dioxide **and** water	allow correct formulae products in any order allow carbon or carbon monoxide allow water vapour or steam or hydrogen oxide	 1 1	2 / 1.4.3b
3(b)(iii)	(burning sulfur) produces sulfur dioxide / SO_2 causes acid rain	allow it/sulfur reacts with oxygen ignore sulfur oxide	1 1	1+2 / 1.4.3c/d
3(c)(i)	propane is a fuel		1	2 / 1.5.1e
3(c)(ii)	double bond drawn between carbon atoms	do not allow any other bonds or symbols	1	1 / 1.5.1c
3(c)(iii)	orange to colourless		1	1 / 1.5.1d
3(c)(iv)	poly(pentene)	allow polymer(s)	1	1 / 1.5.1d
Total			**12**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)(i)	the polymer is not biodegradable the polymer is waterproof		1 1	2 / 1.5.2b/c
4(a)(ii)	any **one** from: • made from a renewable/sustainable resource • is biodegradable	ignore releases less carbon dioxide allow decomposes	1	3 / 1.5.2c/d
4(b)(i)	crushing filtering	in the correct order	1 1	1 / 1.6.1a
4(b)(ii)	open the tap to allow only water to flow out **or** close the tap to leave the oil in the funnel	allow close tap then allow oil to flow out into a separate container	1 1	2 / 1.6.1a
4(c)(i)	They provide a lot of energy		1	1 / 1.6.1b
4(c)(ii)	because the vegetable/plant absorbs / uses carbon dioxide which is released when the biofuel burns	second marking point is dependent on first marking point allow a fossil fuel releases locked up carbon dioxide/carbon if no other mark awarded allow carbon neutral for **one** mark	1 1	1 / 1.5.2a
Total			**10**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)(i)	(calcium) carbonate	ignore $CaCO_3$	1	1 / 1.2.1a
5(a)(ii)	(thermal) decomposition		1	1 / 1.2.1b
5(a)(iii)	water	allow H_2O allow hydrogen oxide	1	1 / 1.2.1d
5(a)(iv)	alkali	allow base	1	1 / 1.2.1d
5(b)(i)	straight line through the first, second and fourth points straight line through the last four points	 allow a straight line through the last three points if the first straight line extrapolates below point four	1 1	2+3 / 1.2.1g
5(b)(ii)	repeat the experiment (at each mass of aggregate) (use the results to) calculate a mean / average value (for each mass of aggregate)	do not allow repeat at other masses	1 1	3 / 1.2.1g

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(b)(iii)	line drawn to y axis showing extrapolation		1	2+3 / 1.2.1g
	correct value read from graph	allow +/- one small square do not allow 0 award 1 mark for a value of 34-40 if no extrapolation shown	1	
5(b)(iv)	at first, the force needed to break a concrete beam increases	allow values allow at first the statement is correct	1	3 / 1.2.1g
	but the force needed to break a concrete beam then decreases	allow values	1	
	mention of 400 g as the point at which the force needed changes or value from graph	allow 400g if there is no intercept on graph	1	
Total			**13**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.	
6(a)	any **one** from: • not enough evidence or proof • (life and the Earth were created) billions of years ago	allow no evidence or no proof allow a long time ago ignore different beliefs or no one was there	1	2 / 1.7.2d	

6(b) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, and apply a 'best-fit' approach to the marking.

1+2+3 / 1.7.1a/b/c / 1.7.2a/b/c/f/g/h

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content	Statements based on diagrams	Description of how one change occurred	Descriptions of how at least two changes occurred

Examples of chemistry points made in the response could include:

Main changes

- oxygen increased because plants / algae developed and used carbon dioxide for photosynthesis / growth producing oxygen; carbon dioxide decreased because of this
- carbon dioxide decreased because oceans formed and dissolved / absorbed carbon dioxide; carbon dioxide became locked up in sedimentary / carbonate rocks and / or fossil fuels
- oceans formed because the Earth / water vapour cooled and water vapour in the atmosphere condensed
- continents formed because the Earth cooled forming a supercontinent / Pangaea which formed the separate continents
- volcanoes reduced because the Earth cooled forming a crust

Other changes

- nitrogen has formed because ammonia in the Earth's early atmosphere reacted with oxygen / denitrifying bacteria

Total			7